

Unit Cover Page

Unit Title: Geometric Measurement **Grade Level(s):** Grade 7

Subject/Topic Area(s): Geometry

Key Words: Area, Perimeter, and Rigid Transformations

Designed By: Christina Dionne **Time Frame:** 17 80 minute periods

School District: RSU #58 **School:** Phillips Elementary School

Brief Summary of Unit (including curricular context and unit goals):

In this unit, students will learn about problem solving that involves area and perimeter. They will begin the unit by focusing on the units of measurement, and how to properly use them when dealing with perimeter and area. In lesson two, students will be exploring how polygons can break down into regular polygons which can be easier to find the area of. Lesson three builds upon the previous lesson, and challenges students to find the area and perimeters of different irregular polygons, while lesson four will have the students thinking about how to change a polygon, but have the area and perimeter remain the same. The fifth lesson will have the students using these skills to answer problems that involve the area for any polygon, circle, or combination. The unit will be wrapped up as students argue the importance of units by using the knowledge they have gained throughout the lesson. Through the use of technology and various activities, the students will be involved and engaged during this unit, therefore enhancing their learning experience.

Unit design status: ___ completed Template pages - Stage 1, 2, and 3

___ completed Blueprint for each performance task ___ completed rubric(s)

___ directions to students & teachers ___ materials & resources listed

___ suggested accommodations ___ suggested extensions

Status: initial draft (date - _____) revised draft (date - _____)

___ peer reviewed ___ content reviewed ___ field tested ___ validated ___ anchored

Stage 1: Identify Desired Results.

Established Goals:

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Maine Learning Results: Mathematics- C. Geometry

Geometric Measurements

Grade 7

2. Students solve problems involving perimeter and area.

What understandings are desired?

Students will understand that:

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- solving problems involves finding the perimeters of any polygon or circle.
- solving problems involves finding areas of polygons and circles.
- units are important when solving problems involving area and perimeter.

What essential questions will be considered?

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- Why are equations of parallelograms, regular polygons, and circles different?
- What parts of a polygon or circle will help solve a problem involving area and perimeter?
- How can area and perimeter of irregular polygons or combined figures be found?

What key knowledge and skills will students acquire as a result of this unit?

Students will know:

- Formulas: Parallelogram- $A=lw$, $P=2l+2w$. Circle- $A=(\pi)r^2$, $P=2(\pi)r$ Triangle- $A=(\frac{1}{2})lw$. Regular polygon- $A=ap$. Oval- $A=(\pi)ab$
- Terminology: perimeter, regular, irregular, area, length, width, radius, apothem, circumscribed, and inscribed.
- Critical Details: combined figures can be broken down into circles, triangles, and/or squares

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Students will be able to:

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- prove combined polygons can be broken down into triangles or squares.
- illustrate possible shapes for given area and perimeters.
- solve the area for any polygon or circle or any combination.
- argue that units must be the same when finding area or perimeter.
- consider how to find perimeter of any irregular or regular shape.
- be aware of the unit of measurement.

Stage 2: Determine acceptable evidence.

What evidence will show that students understand?

Performance Tasks* (Summary in G.R.A.S.P.S. form):

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Goal: Redesign a bedroom by choosing flooring, paint (or wallpaper), and trim.

Role: You are competing for a spot on the Discovery Kids show Trading Spaces: Boys vs. Girls.

Audience: You must convince the host, Chuck Cureau, that your team has the skills.

Situation: Choose a room, draw out a floor plan, and design on a budget.

Product/Presentation: Your team will create a glogster poster which the team will then present.

Standards (Criteria from both rubrics - product and presentation): Glogster rubric: Required Elements 20%, Content Accuracy 20%, Knowledge Gained 20%, Use of Class Time 10%, Participation 10%, and Graphics - Originality 20%. Presentation rubric: Preparedness 20%, Content 20%, Stays on Topic 20%, Posture and Eye Contact 10%, Volume 10%, Listens to Other Presentations 20%.



**Complete a Performance Task Blueprint for each task (next page).*

Other Evidence (quizzes, tests, prompts, observations, dialogues, work samples, etc.):

- Glogster: shows the breakdown of several polygons with measurements. Explains corresponding angles, area, and perimeter.
- ComicLife: create a story of several shapes with the same area or perimeter but look alike.
- GoogleEarth: use the ruler in GoogleEarth to find the perimeter and area of buildings at certain locations.
- Scriblar: create a presentation that demonstrates the importance of units.
- Garageband: create a short news bulletin about perimeter, regular and irregular polygons, and circles.
- iMovie: create a short video of where units of measurement are found in real life, and what happens when used for area and perimeter and the units are not the same.

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Student Self-Assessment and Reflection:

- Give the final test to the students to determine what concepts they already know and what they need to work on.
- Give the students a checklist containing all important concepts (calculating area, perimeter...) and have them check off the concepts when they feel they have mastered it.
- Students will fill out a sheet that asks if they are having difficulty with any section. Also ask if they had not mastered a topic as much as they thought after they have taken a quiz or test.

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Assessment Task Blueprint

What understandings/goals will be assessed through this task?

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•Maine Learning Results
Mathematics
C. Geometry

•Solving problems involves the perimeter and area of polygons and circles.

What criteria are implied in the standard(s)/understanding(s) *regardless* of the task specifics? What qualities must student work demonstrate to signify that standards were met?

•Geometric Measurement

•2D space

Through what authentic performance task will students demonstrate understanding?

Task Description:

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Discovery's hit show, *Trading Spaces: Boys vs. Girls*, is looking for new kids your age to be on their show. In order to get cast in an episode next month, you must show the host, Chuck Cureau, that you and your partner have the skills. To convince Chuck, you will need to show him your design skills by presenting a Glogster of a room your team has redesigned. However, Chuck wants the best of the best, so you will need to stay on a budget of \$1000 when you redesign the room with new floors, paint or wallpaper, and trim.

What student products/performances will provide evidence of desired understandings?

•Glogster

•Presentation

By what criteria will student products/performances be evaluated?

•Required Elements 20%
•Content Accuracy 20%
•Knowledge Gained 20%
•Use of Class Time 10%
•Participation 10%
•Graphics - Originality 20%

•Preparedness 20%
•Content 20%
•Stays on Topic 20%
•Posture and Eye Contact 10%
•Volume 10%
•Listens to Other Presentations 20%



Stage 3: Plan learning experiences and instruction.

Consider the W.H.E.R.E.T.O. elements.

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1. Students will understand that units are important when solving problems involving area and perimeter (**Where**). Students solve problems involving perimeter and area (**What**). Carpenters, painters, architects, designers, home owners, scientists, engineers, electricians and more all use units when performing calculations necessary for their work (**Why**).

2. Have students design units, such as 3 certain students is equivalent to 1 other student, and see what happens when their units are mixed when finding area and perimeter as they create polygons by standing next to one another (**Hook**).

3. Students will know: **Formulas:** $A=lw$, $P=2l+2w$ for a parallelogram, $A=(\pi)r^2$, $P=2(\pi)r$ for a circle, and $A=\frac{1}{2}lw$ for a triangle; **Terminology:** perimeter, area, length, width, radius, diameter (**Equip**). Students will use the Problem-Solution Chart to work through various problems where the units are different (**Explore**). Students will form Think-Pair-Share teams to work on the graphic organizer and questions that go along with the graphic organizer (**Experience**).

4. Students will learn about converting units, and that when finding area or perimeter, it is crucial to ensure the units are the same (**Rethink**). Students will have the opportunity to go over their work and correct as necessary (**Revise**). The students will take a quiz before the summative assessment to ensure they have mastered the material (**Refine**).

5. Students will keep a daily journal of how they think they are doing with the lesson. They will also keep track of the types of problems that they are having difficulty with, and the ones they have mastered (**Evaluate**).

6. **Logical:** Students will receive more difficult problems where they will convert units (some units will be imaginary).

Kinesthetic: Students will create polygons with their bodies. They will set up units, 3 certain students equals 1 other student, and will discover what happens when you incorrectly use units to find area or perimeter.

Interpersonal: Students will need to discuss and cooperate to successfully do the standing polygon activity.

Verbal: Students will discuss with each other how to solve problems on the graphic organizer, as well as the unit activity.

Intrapersonal: Students are asked to reflect in journals and think about worksheets on their own at first.

Naturalist: Students will discuss how units can relate to nature (such as temperature). (**Tailor**)

7. Students will be able to be aware of the unit of measurement when finding area and perimeter.

Summative assessment: iMovie. 3 days (**Organize**)

Stage 3: Plan learning experiences and instruction.

Consider the W.H.E.R.E.T.O. elements.

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8. Students understand that solving problems involve finding areas of polygons and circles (**Where**). Students solve problems involving perimeter and area (**What**). Collapsible items, such as futons or gym equipment, are made of several polygons that can be broken down to save space (or area). Art works combine polygons to create designs and patterns (**Why**).

9. Talk with the students about music, how the sounds of instruments are put together to form a whole musical piece. Then show them artwork of patterns and they will use tangrams to create some artwork as well (**Hook**).

10. Students will know: **Formulas:** $A=lw$ and $P=2l+2w$ for a parallelogram; $A=\frac{1}{2}lw$ for a triangle; and $A=(\pi)r^2$ for a circle; **Terminology:** perimeter, area, length, width, radius, diameter; **Critical detail:** combined figures can be broken down into circles, triangles, and/or squares (**Equip**). The students will use the Problem-Solution Chart for a graphic organizer. On one side would be an irregular polygon, the student must find the least amount of shapes to break it down into in order to be able to find the area (**Explore**). They will work in a Team Pair Solo style of cooperative learning (**Experience**).

11. Students will be rethinking the shapes they see in front of them and deciding how to best find out the area by breaking it down into the least amount of regular shapes (**Rethink**). When students complete the graphic organizer and other homework, they will be allowed to go back over it after it has been corrected to redo the problems they missed (**Revise**). The students will take a quiz before the summative assessment to ensure they have mastered the material (**Refine**).

12. Students will fill out a journal entry daily on how they think they are doing, their strong points, their weak points, and concepts they fully understand and do not understand (**Evaluate**).

13. **Visual:** Show students art works that have different figures combines, have them find different shapes within the art work.

Naturalist: Show students art works of nature that have combined figures. They will find different shapes composed of other shapes within it.

Intrapersonal: Students will reflect in their journals about how they are doing with the lesson, as well as what they believe the big picture is.

Musical: Begin the discussion with relating the lesson to the breakdown of music; as different instruments are played, they create a whole piece.

Logical: Have the students discuss when it is appropriate to break down figures, and how much a figure should be broken down.

Interpersonal: Students will do group work, which will break down into pairs, and then break off into solo work. While in groups, students will have the opportunities to discuss problems and share ideas. (**Tailor**)

14. Students will be able to explain how combined polygons can be broken down into triangles and squares. Summative assessment: Glogster. 3 days (**Organize**)

Stage 3: Plan learning experiences and instruction.

Consider the W.H.E.R.E.T.O. elements.



15. Students will understand that solving problems involves finding the perimeters of any polygon or circle and finding the area of any polygon or circle (**Where**). Students solve problems involving perimeter and area (**What**). Not every shape in life is a regular shape and they must equip themselves with the ability to find the perimeter of any shape for when they do projects such as painting or building a birdhouse (**Why**).

16. Start off with an activity of finding the area of a wacky birdhouse so they will know how much wood they will need (**Hook**).

17. Students will know: **Formulas:** $A=lw$, $P=2l+2w$ for a parallelogram, $A=(\pi)r^2$, $P=2(\pi)r$ for a circle, $A=\frac{1}{2}lw$ for a triangle, and $A=ap$ for a regular polygon; **Terminology:** perimeter, area, regular, irregular, apothem, length, width, radius; **Critical Details:** a polygon can be broken into squares and triangles to find area and perimeter (**Equip**). The students will be using Problem-Solution chart as a graphic organizer (**Explore**). Students will be Numbered Head groups. They will solve the problems together and work until all members understand the problem and get them correct (**Experience**).

18. Student will rethink the process for finding area and perimeter (**Rethink**). When students complete the graphic organizer and other homework, they will be allowed to go back over it after it has been corrected to redo the problems they missed (**Revise**). The students will take a quiz before the summative assessment to ensure they have mastered the material (**Refine**).

19. Students will keep a daily journal of how they think they are doing with the lesson. They will also keep track of the types of problems that they are having difficulty with, and the ones they have mastered.

(**Evaluate**)

20. **Verbal:** Students will create a short news bulletin about perimeter, regular and irregular polygons, and circles.

Kinesthetic: Students may incorporate activities such as running, jumping, or sports into their news bulletin that discusses perimeter.

Musical: Students will create a short rap or song of the equations for area of a regular polygon and oval.

Interpersonal: Students will be in groups and discuss to each other how to find perimeter and area.

Naturalist: At the beginning of the lesson, students will be finding the area of a birdhouse. The students will also discuss how the shape of a birdhouse matters.

Logical: Ask students to find area and perimeter of polygons that are given to them only as coordinate points which they must plot.

(**Tailor**)

21. Students will be able to consider how to find perimeter and area of any irregular or regular shape.

Summative assessment: Garageband. 3 days (**Organize**)

Stage 3: Plan learning experiences and instruction.

Consider the W.H.E.R.E.T.O. elements.



22. Students will understand that solving problems involves finding the perimeters and area of any polygon or circle (**Where**). Students solve problems involving perimeter and area (**What**). When given a certain amount of material, students can utilize their knowledge to get the most out of the material, such as making a quilt or baking cookies (**Why**).

23. Students will be in groups and form polygons with their bodies. They will then reorganize and make as many polygons with the same area and perimeter (**Hook**).

24. Students will know: **Formulas:** $A=lw$, $P=2l+2w$ for a parallelogram, $A=(\pi)r^2$, $P=2(\pi)r$ for a circle, $A=\frac{1}{2}lw$ for a triangle, $A=ap$ for a regular polygon, and $A=(\pi)ab$ for an oval; **Terminology:** perimeter, regular, irregular, area, length, width, radius, apothem, circumscribed, and inscribed; and **Critical Details:** a polygon can be broken into squares and triangles to find area and perimeter (**Equip**). Students will use the Problem-Solution chart of different area and perimeter combinations, and the students will have to provide several possibilities (**Explore**). Students will form Think-Pair-Share teams to work on the graphic organizer and questions that go along with the graphic organizer (**Experience**).

25. Students will rethink the idea that a specific area and perimeter can only form one shape (**Rethink**). Students will be able to correct their homework, and redo problems they missed (**Revise**). The students will take a quiz before the summative assessment to ensure they have mastered the material (**Refine**).

26. Students will keep a daily journal of how they think they are doing with the lesson. They will also keep track of the types of problems that they are having difficulty with, and the ones they have mastered (**Evaluate**).

27. **Kinesthetic:** Students will be in groups and form shapes with their bodies. They will then reorganize and make another shape with the same area and perimeter.

Visual: Students will be creating a ComicLife of a story of different shapes that have the same area and perimeter.

Verbal: Students will need to write out a story for the ComicLife.

Interpersonal: Students will work together and interact while in groups to create different shapes with the same area and perimeter.

Naturalist: Students can consider the the perimeter of trees and how that affects the area of the tree.

Logical: Students will be asked to consider more complex solutions when solving for shapes that look different, but have the same area, such as removing area from the center.

(Tailor)

28. Students will be able to illustrate possible shapes for given area and perimeter. Summative assessment: ComicLife. 2 days (**Organize**)

Stage 3: Plan learning experiences and instruction.

Consider the W.H.E.R.E.T.O. elements.



29. Students will understand that solving problems involve finding areas of polygons and circles (**Where**). Students solve problems involving perimeter and area (**What**). Anyone needs to estimate how much supplies they will need to paint a wall, build something, and to cook (**Why**).

30. Students will explore using GoogleEarth and how to find area and perimeter of random buildings (**Hook**).

31. Students will know: **Formulas:** $A=lw$ for a square, $A=\frac{1}{2}lw$ for a triangle, and $A=(\pi)r^2$ for a circle; **Terminology:** area, regular, irregular, circumscribed and inscribed; and **Critical Details:** a polygon can be broken into squares and triangles to find area and perimeter (**Equip**). They will use two different graphic organizers; one with the areas of regular polygons, and another specifically for circles and ovals (**Explore**). The students will use Think-Pair-Share group style to help each other work through the graphic organizers. Then the class discusses as a whole (**Experience**).

32. Students will rethink that area is just base multiplied by height for all shapes (**Rethink**). To revise their work, students will work in pairs to determine the appropriate answers, and why their previous answers were wrong (**Revise**). The students will take a quiz before the summative assessment to ensure they have mastered the material (**Refine**).

33. Students will complete a journal entry and state where they are struggling, what they really know, and what they are unsure of. They will also have a checklist of the different shapes and fill in how to find the area of each (**Evaluate**).

34. **Visual:** Students will have graphic organizers to use while doing area problems, it separates the shapes into different categories.

Verbal: Each student will explain to their partner the process they went through to find the area of all of the shapes on the graphic organizer.

Interpersonal: The students will be in Think-Pair-Share groups which will discuss with each other the process of finding the area of the shapes.

Musical: Students will create a short song or rap that helps them remember how to find the area of a regular shape with more than 4 sides.

Intrapersonal: After students have completed the graphic organizer and worksheet, they will then fill out a self-assessment sheet that will ask them to reflect on what they have learned and where their strong/weak points are.

Logical: Ask students to try to find a way to solve area problems where a shape is inscribed in a circle or polygon. (**Tailor**)

35. Students will be able to solve the area for any polygon or circle or any combination. Summative assessment: GoogleEarth. 3 Days (**Organize**)

Stage 3: Plan learning experiences and instruction.

Consider the W.H.E.R.E.T.O. elements.



36. Students will understand that units are important when solving problems involving area and perimeter (**Where**). Students solve problems involving perimeter and area (**What**). Units affect the outcome of area and perimeter; units are found everywhere when building, painting, and other crafts (**Why**).

37. The students will be shown a student example of the summative assessment (**Hook**).

38. Students will know: **Formulas:** $A=lw$, $P=2l+2w$ for a parallelogram, $A=(\pi)r^2$, $P=2(\pi)r$ for a circle, $A=\frac{1}{2}lw$ for a triangle, $A=ap$ for a regular polygon, and $A=(\pi)ab$ for an oval; **Terminology:** perimeter, regular, irregular, area, length, width, radius, apothem, circumscribed, and inscribed; and **Critical Details:** a polygon can be broken into squares and triangles to find area and perimeter (**Equip**). Students will use the Flow Chart to describe the steps of properly using units (**Explore**). Students will be in Numbered Heads groups where they will discuss the graphic organizer (**Experience**).

39. Students will reinforce the importance of units and how they relate to area and perimeter (**Rethink**). Students will be able to correct their homework, and redo problems they missed (**Revise**). The students will take a quiz before the summative assessment to ensure they have mastered the material (**Refine**).

40. Students will keep a daily journal of how they think they are doing with the lesson. They will also keep track of the types of problems that they are having difficulty with, and the ones they have mastered. (**Evaluate**).

41. **Kinesthetic:** Students can repeat the activity of the first lesson where they specified that 3 students were equal to 1 other student and see how that affected the area and perimeter.

Intrapersonal: Students will reflect over the entire unit. State what could have gone better, where they most improved, and where they are highly skilled.

Musical: Students can include the songs they have created into the Scriblar to use as a part of their argument.

Naturalist: Students can do the summative assessment by incorporating elements of nature into their presentation.

Visual: Students will be using Scriblar to create a presentation to argue the importance of units.

Logical: Students will have to create an argument about why units are important when finding area and perimeter.

(Tailor)

42. Students will be able to argue that the units must be the same when finding area or perimeter.

Summative assessment: Scriblar. 3 days (**Organize**)

Stage 3: Plan learning experiences and instruction.

Consider the W.H.E.R.E.T.O. elements.

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Friday	5 15. Area and Perimeter (w) 16. Birdhouse (H) 17. Numbered Heads (E) 18. Quiz (R) 19. Blog (E-2) 21. Empathy (O)	3	10		15	2	Present Products
Thursday	4		9 29. Area (w) 30. GoogleEarth (H) 31. Think-Pair-Share (E) 32. Quiz (R) 33. Blog (E-2) 35. Apply (O)	3	14		
Wednesday	9 8. Area of polygon or circle (w) 9. Music, art, tangrams (H) 10. Team-Pair-Solo (E) 11. Quiz (R) 12. Blog (E-2) 14. Explain (O)	3	8		13		WebQuest
Tuesday	2		7 22. Perimeter (w) 23. Body Shapes (H) 24. Think-Pair-Share (E) 25. Quiz (R) 26. Blog (E-2) 28. Interpret (O)	2	12		
Monday	1 1. Units (w) 2. Creating polygons with body (H) 3. Think-Pair-Share (E) 4. Quiz (R) 5. Blog (E-2) 7. Self-Knowledge (O)	3	6		11 36. Units (w) 37. Student Sample (H) 38. Numbered Heads (E) 39. Quiz (R) 40. Blog (E-2) 42. Perspicitve (O)	3	